

REMARKS

This is a full and timely response to the Office Action dated March 13, 2003. By this amendment, Claims 14-19 have been canceled without prejudice or disclaimer, and Claims 1-3 and 5-13 remain as originally filed. Claim 4 is amended to correctly state that the battery is charged from the "ac link," as clearly described in paragraphs 29-31. The Specification has been amended at paragraph 27, wherein the reference numeral 46 on line 8 is replaced with reference numeral 40. Applicants respectfully submit no new matter has been added by the foregoing amendments, and respectfully request re-examination and reconsideration of the present application.

Applicant acknowledges and affirms the election to the invention of Group I, Claims 1-13, made on February 28, 2003. Claims 14-19 have been canceled by the present amendment, as being directed to non-elected invention. Applicant reserves the right to file additional applications directed to the invention of Group II, Claims 14-19, that claim benefit of the present application.

Claim Rejections Under 35 U.S.C. §103(a) Based on Gilbreth in View of Underwood

In the Office Action, Claims 1-3 and 5-13 were rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,487,096 to Gilbreth et al. in view of U.S. Patent No. 6,072,302 to Underwood et al. It is alleged in the Office Action that Gilbreth discloses a turbine engine generator supplying electric energy to a utility grid, a battery source with a voltage boosting circuit producing dc power in a startup mode and a transient load mode, a power converter, a main inverter, and a battery charging circuit coupled to an ac link via an inverter to charge the battery source in a charging mode when the turbine generator is not generating electrical power. It is conceded in the Office Action that Gilbreth does not disclose a transformer selectively coupled to the main inverter and utility grid. However, Underwood et al. allegedly discloses a turbine generator system supplying electric energy to a utility grid via a power converter and an inverter, wherein a transformer is selectively coupled to the main inverter and the utility grid for purposes of matching the grid power. It is then concluded in the Office Action that it would have been obvious to one having ordinary skill in the art at the time of the invention was made to design the system allegedly taught by Gilbreth and provide the

transformer selectively coupled to the main inverter and the utility grid, as allegedly taught by Underwood et al., for the purposes of matching the grid voltage.

The Gilbreth patent is directed to a power controller that provides a distributed power networking system in which bi-directional power converters are used with a common dc bus for permitting compatibility between various energy components. In FIG. 4 of the Gilbreth patent, illustrated is a power architecture of an implementation of the power controller. The power controller includes a generator converter 72 and an output converter 74 that provides for the power conversion that takes place between the turbine 76 and the load/utility grid 78. The generator converter 72 provides for ac to dc power conversion and the output converter 74 provides for dc to ac power conversion. Both of the power converters 72, 74 are capable of operating in a forward or reverse direction, which allows starting the turbine 76 from either the energy storage device 86 or the load/utility grid 78. In addition, since the energy allegedly flows in either direction to or from the energy storage device 86, transients may be handled by supplying energy or absorbing energy. If the turbine is started using energy from the energy storage device 86, then the energy is replaced by drawing power from the dc bus 62 from the operating turbine (see column 6, lines 54-63; column 12, lines 18-31; and column 15, lines 54-59).

In marked contrast, the present invention provides systems and methods for managing a battery source associated with a microturbine power generating system, including charging the battery source from the utility grid when the turbine engine is not running. Specifically, the present invention includes a battery charging circuit for controlling the charging of the battery source from the utility grid or the generator output. The charging source power is conditioned by the battery charging circuit through an alternating current transformer and rectifier. The direct current output of the rectifier is supplied to a down chopper that provides a constant current to the battery source. The level of current is determined from sensors that measure battery temperature and voltage, and is controlled by the controller. The controller utilizes the battery temperature to set the charging current level and the maximum charging voltage. The same ac source can also be used to supply a thermostatically controlled heater for batteries that may be exposed to extremely low temperatures.

Applicant respectfully submits that independent Claim 1 is not taught or suggested by Gilbreth alone or in combination with Underwood in that neither reference teaches or suggests a battery charging circuit as claimed in independent Claim 1. Specifically, Claim 1 recites

“a battery charging circuit coupled to the ac link and the battery source, wherein the charging current converts ac power on the ac link to dc power to charge the battery source in a charging mode when the turbine engine is not generating mechanical power.”
(Emphasis added.)

This feature is not taught or suggested by Gilbreth, which merely teaches the recharging of the energy storage device utilizing power generated by the turbine and accessed at the dc link between the generator converter 72 and the output converter 74. Accordingly, Gilbreth does not teach the recharging of the energy storage device with power from the ac link that is then converted to dc power in a charging mode when the turbine is not operating. This feature also is not taught or suggested by Underwood, which does not address battery recharging.

Accordingly, Applicant respectfully submits that independent Claim 1 is patentable over the combination of Gilbreth in view of Underwood because the combination fails to teach or suggest the battery charging circuit recited in Claim 1. Therefore, as a matter of law, dependent Claims 2-3 and 5-13 are also allowable over the present rejection in that they depend from an allowable independent claim. However, notwithstanding their allowability as a matter of law, Applicant respectfully submits that defendant Claims 6, 7, 9-11 recite features which are independently patentable over the present rejection. Specifically, Claims 6, 7 and 10 are directed to a down chopper circuit that provides dc power to the battery source at a reduced voltage for purposes of charging the battery. As mentioned above, the prior art fails to teach the use of ac power for purposes of charging the battery, and therefore, does not include a down chopper that is responsive to the ac power for providing dc power at a reduced voltage. In addition, the present rejection fails to teach the use of a temperature sensor for purposes of controlling the charging of the battery source, as recited in Claim 9, nor the opening of the ac link between the main inverter and the transformer during the charging mode, as recited in Claim 11.

Therefore, Applicant respectfully submits that Claims 1-3 and 5-13 are patentable over the present rejection.

Claim Rejections Under 35 U.S.C. §103(a) Based on Gilbreth
in View of Underwood and Kern

In the Office Action, Claim 4 was rejected under 35 U.S.C. §103(a) as being unpatentable over Gilbreth in view of Underwood as applied to Claim 1 above and further in view of U.S. Patent No. 6,081,104 to Kern. It is alleged in the Office Action that Kern discloses a power supply system including the pulse-width modulatable storage unit and the controller for pulse-width modulating the storage unit, and the controller pulse-width modulating the storage unit for the purpose of controlling the output voltage when the battery is augmenting the system demand when it exceeds the capacity of the power source. It is concluded in the Office Action that it would have been obvious to one of ordinary skill in the art at the time the invention was made to design the combined system and to provide the pulse-width modulatable storage unit in the controller for pulse-width modulating the storage unit as taught by Kern, for the purpose of controlling the output voltage when the battery is augmenting the system demand when it exceeds the capacity of the power source.

Applicant respectfully submits that dependent Claim 4 is patentable over the present rejection as a matter of law because it depends from allowable independent Claim 1. Notwithstanding the allowability of dependent Claim 4 as a matter of law, Applicant respectfully submits that Claim 4 independently recites features not taught or suggested by the prior art. Specifically, the PWM control chip 176 of Kern is designed to control the output of the DC-to-DC converter 66 via the reference signal on node 86 (see generally, column 12, line 19 to column 13, line 6). It does not teach or suggest the use of a PWM control for “storing the dc power from the ac link,” as recited in Claim 4.

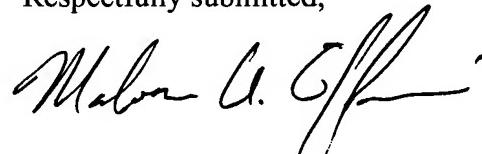
Accordingly, Applicant respectfully submits that dependent Claim 4 is allowable over the present rejection, and therefore is in condition for allowance.

CONCLUSION

For at least the reasons set forth above, it is respectfully submitted that all pending claims in the present application are in condition for allowance. It is believed that all outstanding objections and/or rejections have been rendered moot, accommodated and/or traversed. If the Examiner is compelled to do other than allow all the pending claims, or has any comments or suggestions which will place the application in even better form for allowance, the Examiner is respectfully requested to contact the undersigned attorney.

It is not believed that extensions of time or fees for net addition of claims are required beyond those which may be otherwise provided for in the documents accompanying this paper. However, in the event that additional extensions of time are necessary to allow consideration of this paper, such extensions are hereby petitioned under 37 CFR § 1.136(a), and any fee required therefore (including fees for net addition of claims) is hereby authorized to be charged to Deposit Account No. 19-5029.

Respectfully submitted,



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